



Experiences Linking Vehicle Motion Simulators to Distributed Simulation Experiments

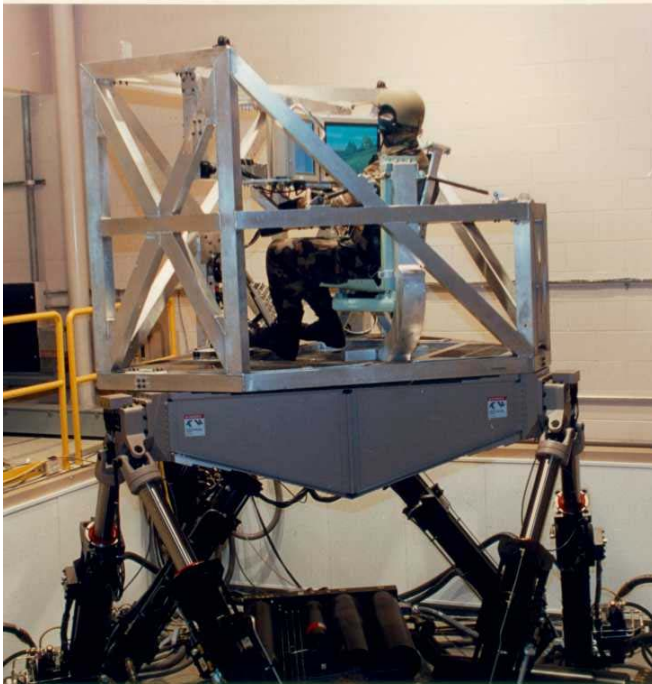
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Introduction

- TARDEC Motion Simulators
- Past Experiences
- Current Activities
- Conclusions

TARDEC Motion Simulators



Ride Motion Simulator (RMS)



Crew Station / Turret Base Motion Simulator (CS/TMBS)

TARDEC Motion Simulators (cont.)

- RMS Single person crew station 40 Hz
- CS/TMBS full turret fully operational 8 Hz
- 6 Degree-of-Freedom
- Creates a virtual vehicle environment of motion visualization and sound
- Current vehicles that can be simulated M1, M2, HMMWV, Stryker

Past Experiences

- RMS with Distributed Interactive Simulation (DIS) and ModSAF
- Symbolically Optimized Vehicle Analysis System (SOVAS) and HLA
- RMS and HLA
- The Dynamic Reconfigurable Engineering Workstation (DREW)
- Vehicle Dynamics and Mobility Server (VDMS)

RMS with Distributed Interactive Simulation (DIS) and ModSAF

- What was done
 - Wrote RMS software to use DIS with ModSAF
- Experiences / Lessons Learned
 - Vehicle did appear in ModSAF
 - Could not provide two way communication due to issues with C Object Oriented Programming System (COOPS) development environment

SOVAS and HLA

- What was done
 - Satisfy a requirement for SOVAS to be HLA compliant
- Experiences / Lessons learned
 - Making an existing simulation natively HLA compliant is hard
 - Requires a lot of time and code
 - The network was also a problem

RMS and HLA

- What was done
 - Satisfy a requirement for RMS software to be HLA compliant
- Experiences / Lessons Learned
 - Making an existing simulation natively HLA compliant is hard
 - Requires a lot of time and code
 - The code that was created is fragile (it hangs and crashes for no apparent reason)

The Dynamic Reconfigurable Engineering Workstation (DREW)

- What was done
 - Connected the RMS with the National Advanced Driving Simulator at the University of Iowa over the internet for engineering level analysis
 - Used a commercial product Network Data Delivery Service and not HLA
- Experiences / Lessons Learned
 - The project was successful
 - Existing HLA technology was not up to the task
 - Indicated a need for further development of a real-time HLA RTI

Vehicle Dynamics and Mobility Server (VDMS)

- What was done
 - Used the GVSL vehicle dynamics simulation running on a GVSL server to provide the vehicle dynamics characteristics for simulated vehicles in OTB running on a remote server.
- Experiences / Lessons Learned
 - Created better VDMS code
 - Learned about capabilities of NIU

Current Experiences

- What do we want to do?
 - Have the RMS and CS/TMBS participate in a distributed virtual experiment using OneSAF Test Bed 2.0
- Why do we want to do it?
 - Because there is still a requirement for the RMS code to be HLA compliant.
 - OneSAF is the main Army distributed forces simulation program now and in the future.
- How are we going do it?
 - Use the DMSO Federation Execution and Development Process (FEDEP)

What is the FEDEP

- Six step process developed from federation developers experiences
 - Step 1: Define Federation Objectives
 - Step 2: Develop Federation Conceptual Model
 - Step 3: Design Federation
 - Step 4: Develop Federation
 - Step 5: Integrate and Test Federation
 - Step 6: Execute Federation and Prepare Results

Where are we now?

- In the middle of step 4
- This is where the simulations are modified so that they can interoperate (send and receive data) with other simulations and be able to act on that data.

What do we have left to do in Step 4

- Define objects, attributes and interactions for each simulation (federate) that will be shared to create a Simulation Object Model (SOM)
- Combine the SOM of all of the federates to create a Federation Object Model (FOM)
- Modify the RMS code to support HLA requirements.

What about FEDEP Step 5 and 6

- Step 5
 - Work out all of the problems and get the federation to work correctly
- Step 6
 - Run the test Scenario with each vehicle that the RMS can represent

Conclusions

- Creating a native HLA compliant simulation takes a lot of time and a lot of programming
- The FEDEP is an excellent tool for federation development

Resources

- Dr. David A. Lamb, “High Level Architecture and the SOVAS Modeling System: Lessons Learned While Achieving Compliance”, 2002 Summer Computer Simulation Conference
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- Stacy Budzik, Patrick Nunez, Yiannis Papelis, Dario Solis, “Dual Use Vehicle and Heavy Equipment Virtual Proving Ground (VHEVPG)”, IVSS-2002-MAS-05, NDIA 2nd Annual Intelligent Vehicle Systems Symposium, Traverse City, MI, June 2002.
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Questions?